(1) the paper, (2) the lens, or (3) the sphere. In the present apparatus the first method has been adopted, and now the camera is about twice as long as it was in June. As a consequence the circular image is enlarged, and the light therefore weakened, and that at a time of year when it can least be spared. If the focus is altered by moving the lens, the winter circle is small and the summer circle is much larger. This would perhaps be too much to the advantage of the winter sun. If, however, the lens and paper are maintained at a constant distance, and the sphere alone moved, the circles are more nearly of the same diameter throughout the year, the winter one still remaining the smallest. This seems, therefore, to be the most advantageous arrangement, and the one that will be adopted in future. It may be possible also to find positions for the sphere, lens, and paper such that the intensity of the image is a true measure of the intensity of the sun's light; at present, however, this has not been done, the want of sunlight and the press of official work having prevented the carrying out of the necessary experiments. A more sensitive paper might also be used with advantage, and in observatories where photographic processes are carried on daily there would be no difficulty on this score, but my principal object was to devise some economical instrument requiring only easy manipulation, so that at a considerable number of places the instruments might be set up, giving a more useful average of the duration of sunshine than can be obtained from only a few stations. The instrument also gives a record when the sun is shining through light clouds; in this case the image is somewhat blurred and naturally weakened, and it may be difficult or impossible to employ any scale for measuring the intensity under such conditions, but it must be remembered that, even when the sun is shining in this imperfect manner, it is really doing work on the vegetation of the earth, and deserves to be recorded.

It may be well to say that the instrument is in no way protected. Some friends, whose opinion I highly value, urged me to patent it; but as I strongly hold the view that the work of all students of science should be given freely to the world, the apparatus was described at the Physical Society a few hours after the advice was given, lest the greed of filthy lucre should, on further deliberation, cause me to act contrary to my principles.

Cooper's Hill, January 20 HERBERT MCLEOD

NOTES

PROF. PRESTWICH has been elected a Corresponding Member of the Paris Academy of Sciences in the place of the late Italian geologist, Quintino Sella.

SIR WILLIAM THOMSON opened the laboratories at University College, Bangor, on Monday, with an address, in which he referred to the spread of the laboratory system and the good results which thereby had accrued to science and scientific education. We hope in an early number to give a detailed report of Sir William Thomson's address, with a description and plan of the laboratories.

THE honorary degreee of LL.D. has been conferred upon Prof. Ray Lankester by the University of St. Andrew's.

WE understand that Dr. Dallinger, F.R.S., will take the opportunity of his presidential address to the Royal Microscopical Society to give an account of a new septic organism. The address, which will be fully illustrated, will be delivered on Wednesday next at 8 p.m.

THE Paris Academy of Sciences has decided to send a mission to explore the districts in the south of Spain where the recent earthquakes took place. M. Fouqué, Professor of Geology in the Collège de France, is appointed chief of the mission, which was to leave Paris last week. The other members are M. Lévy, mining engineer and sub-director of the geological laboratory of the College of France; M. Bertrand, mining engineer; M. Barrois, of the Faculty of Sciences at Lille; and MM. Killian and Oppret, of the College of France.

AMONGST the honorary members elected to the Italian Society of Geography at its meeting of the 25th ultimo was Mr. Joseph Thomson.

A MEETING of much interest was held at the Rooms of the Asiatic Society on Monday in connection with the establishment of a British School of Archæology at Athens. Already Germany, France, and the United States have been in the field for some time; but though the Greek Government has presented to the English Society a choice site of considerable extent for a school, funds are lacking wherewith to erect the building and carry on the work. We need not insist on the value of archæology in historical research,—all the speakers on Monday were agreed as to that; for a scientific knowledge of the past, it bears the same relation to academical study as the researches carried on by the Naples station do to the home study of biology. At present only 4000*l*. are in the hands of the Committee, but four or five times that amount is required ere the School can start with any hope of efficient work. There are several learned societies with ample means, interested in the varied work which would be carried on by such an institution, and to these, and to individuals who have money to spare and wish to put it to a good use, we commend the scheme. The treasurer is Mr. Walter Leaf, Old Change, E.C.

WE regret to learn of the death of M. Dupuy de Lôme at the age of sixty-eight years. M. de Lôme was well known as a naval engineer, and his name is intimately associated with modern ballooning.

THE Council of the Royal Meteorological Society have arranged to hold, at 25, Great George Street, S.W. (by permission of the President and Council of the Institution of Civil Engineers), on the evenings of March 18 and 19 next, an Exhibition of Sunshine Recorders and Solar and Terrestrial Radiation Instruments. The Exhibition Committee invite the co-operation of those interested, as they are anxious to obtain as large a collection as possible of such instruments. The Committee will also be glad to show any new meteorological apparatus invented or first constructed since last March; as well as photographs and drawings possessing meteorological interest.

IN his inaugural address as Lord Rector at St. Andrew's last week, Lord Reay stated very forcibly his ideas of what a university should be at the present day, encouraging every form of culture and research. Referring to science, Lord Reay asked: "Are we to have a separate Faculty of Science? I should say certainly. Just look at the field covered by a Faculty of Science. It is preparatory for medical science, and our engineers, our manufacturers, our analysts, our botanists, our zoologists, our astronomers, our naval constructors, our geologists, our biologists, our physiologists, our mineralogists, our agriculturists, should obtain scientific degrees. I do not see why a faculty having such an immense area should remain linked with another which has quite different objects to pursue. The same work done by the French École Polytechnique I wish to see done at the universities; and if the Germans have lately spent 340,000*l*. on a new college for technical education at Berlin, I should like to ask what possible reason can be adduced for stinting science-teaching in Scotland at a moment when the report on technical instruction has pointed out that 'theoretical knowledge and scientific training are of pre-eminent importance, as in the case of the manufacturer of fine chemicals, or in that of the metallurgical chemist, or the electrical engineer, and that to these the higher technical instruction may with advantage be extended to the age of twenty and twenty-two.' Here, then, is a clear case even for a

Philistine to grant Government aid. With reference to the science faculty, I should like to make a remark which applies also to the other faculties, but very specially to this faculty. I should wish to give it considerable power to establish lectureships on any special subject for which a specially gifted man should be found. Though the number of his pupils might be very limited, the publication of the results of his research, carried on at the University, would raise it in what I should like to call the international scale. Besides, the knowledge of such prizes being attainable would stimulate original research among the most brilliant undergraduates. I wish those lecturers to be incorporated in the University."

WE have received the Report of the Board of Managers of Yale College Observatory for 1883-84. Dr. Elkin is doing good work with the heliometer. The principal lines of investigation to which attention has been directed are as follows :—"(1) The triangulation of the Pleiades. The interest attaching to this work will lie both in the new and independent determination of the relative positions of the stars of this important zodiacal group and in the comparison with the similar determination made with the Königsberg heliometer nearly half a century ago, as well as with the later Paris results. The plan adopted will furnish, it is hoped, trustworthy tests of the reliability of the instrument both for absolute and relative distances and angles of position. From February 24, the date of the arrival of the reversing eye-pieces from Messrs. Repsold, to April 12, after which the stars are lost in the sun's rays, about one-third of the proposed plan has been accomplished. As the group will come into favourable position for observation during the last four months of the year, there is, therefore, all reasonable hope to finish the work during that time. (2) A considerable amount of time has been devoted to the determination of places of the moon relative to stars within measuring-reach of the heliometer. The principal object in view is the determination of the parallactic inequality in the moon's motion, the deduction of which from meridian and other observations is, as is well known, attended with some difficulty. (3) Advantage has been taken of the favourable opportunity afforded by the approaching inferior conjunction of Venus for a series of observations on the diameter of this planet, of which a number have been already secured."

A CIRCULAR from Mr. H. H. Warner, of the Rochester (U.S.) Astronomical Society, gives the following information as to the Warner Astronomical Prizes :—First. Two hundred dollars for each and every discovery of a new comet made from February 1, 1885, to February 1, 1886, subject to the following conditions :—(1) It must be discovered in the United States, Canada, Mexico, West Indies, South America, Great Britain, and the Australian Continent and Islands, either by the naked eye or telescope, and it must be unexpected, except as to the comet of 1815, which is expected to reappear this year or next. (2) The discoverer must send a prepaid telegram immediately to Dr. Lewis Swift, Director Warner Observatory, Rochester (N.Y.), giving the time of the discovery, the position and direction of motion, with sufficient exactness, if possible, to enable at least one other observer to find it. (3) This intelligence must *not be communicated to any other party or parties*, either by letter, telegraph, or otherwise, until such time as a telegraphic acknowledgment has been received by the discover from Dr. Swift. Great care should be observed regarding this condition, as it is essential to the proper transmission of the discovery, with the name of the discoverer, to the various parts of the world, which will be immediately made by Dr. Swift. Discoverers in Great Britain, the Australian Continent and Islands, West Indies, and South America are absolved from the restrictions in conditions (2) and (3). Second. Mr. Warner will also give a prize of 200 dols. in gold to any person in the world who will write the best 3000-word paper on the cause of the atmospheric effects ("red light," &c.) accompanying sunset and sunrise during the past sixteen months. It is desired that these papers be as original as possible, both in facts, observations, and treatment. Essays must be exclusively sent prepaid to Dr. Lewis Swift, Director Warner Observatory, Rochester, New York, must be written in English, on one side of the paper only, with ink, and must be in the simplest untechnical phrase.

WE learn from *Science* that Mr. Henry Lomb, of Rochester, New York, has offered, through the American Public Health Association, the sum of 2800 dols., to be awarded as first and second prizes for papers on the following subjects :—(1) Healthy homes and foods for the working classes : first prize, 500 dols. ; second prize, 200 dols. Essays to be of a practical character, devoid, as far as possible, of scientific terms. They must be within the scope and understanding of all classes, and designed especially for a popular work. (2) The sanitary conditions and necessities of schoolhouses and school-life : first prize, 500 dols. ; second prize, 200 dols. (3) Disinfection and individual prophylaxis against infectious diseases : first prize, 500 dols. ; second prize, 200 dols. (4) The preventable causes of disease, injury, and death, in American manufactories and workshops, and the best means and appliances for preventing and avoiding them : first prize, 500 dols. ; second prize, 200 dols. All essays written for the above prizes must be in the hands of the secretary, Dr. Irving A. Watson, Concord, N.H., on or before October 15, 1885. It is expected that arrangements can be made to have these essays widely distributed to the public, and to the persons mostly interested in the respective subjects in the United States. The American Public Health Association earnestly appeals to those able to compete, to take part in this work, which, it is believed, will do much to augment the health, comfort, and happiness of the people.

WE are glad to notice that classes for the instruction and study of elementary astronomy have been established by the Liverpool Astronomical Society, and will meet every Tuesday in the Association Hall, Mount Pleasant. The opening meeting of the class was held on Wednesday, January 21, at—we are informed—twenty o'clock (eight p.m.), when Mr. Isaac Roberts, F.R.A.S., F.G.S., presided and addressed the students. The class throughout the course will be conducted by Mr. James Gill, of the Liverpool School of Navigation.

THE distinction of Associate of the Linnean Society has recently been conferred on Mr. James E. Bagnall, of Birmingham. Mr. Bagnall is one of the Vice-Presidents of the Birmingham Natural History and Microscopical Society, of which he has for something like a quarter of a century been one of the most useful and hard-working members. He has devoted his principal attention to the study of botany—structural and systematic. His most important published work is the latest and by far the best "Flora of Warwickshire," which has appeared by instalments extending over several years in the *Midland Naturalist*. This work will, we are informed, shortly appear in a thoroughly revised form as an independent publication. Mr. Bagnall belongs to the class of naturalists of which Thomas Edwards is the type.

AT the last meeting of the China Asiatic Society at Shanghai an instrument, which was a species of primitive telephone, was presented for inspection by Dr. Macgowan of Wenchow. It consisted of two bamboo cylinders, from 1½ to 2 inches in diameter, and 4 inches in length ; one end of each was closed by a tympanum of pig-bladder, which was perforated for the transmitting string, the latter being kept in place by being knotted. This rude instrument is called the "listening tubes," and is employed for amusement as a toy, conveying whispers

40 or 50 feet. It is unknown in many parts of China, the provinces of Che-kiang and Kiangsu being the only ones, so far as can be ascertained, where the listening tubes are employed. Besides this toy, Chinese ingenuity produced, about a century and a half ago, the "thousand mile speaker." This implement is described as "a roll of copper, likened to a pipe, containing an artful device; whispered into, and immediately closed, the confined message, however long, may be conveyed to any distance, and thus, in a battle, recent instructions may be conveniently communicated. It is a contrivance of extraordinary merit." The inventor of the "thousand-mile speaker," one Chiang Shun-hsin, of Huichou, flourished during the reign of Kang-hsi, during parts of the seventeenth and eighteenth centuries. He wrote on occult science, astronomy and foreign physics, and the above description of his invention was copied from his works into a provincial encyclopædia. At the time the latter work was published—in the reign of Kien Long—there was no longer an instrument of this kind in the province, as the ingenious invention appears to have perished with the student who contrived it.

THE following very interesting table has been compiled from the records of the meteorological observatory at Tokio. It gives the total number of recorded earthquakes which occurred in the respective months during the ten years ending December 10, 1884:—

January	53	July	36
February	50	August	27
March...	73	September... ...	15
April	43	October	47
May	51	November	51
June	40	December	60

The list would, of course, need to be in full detail for each month of each year, in order that any safe deduction might be made from it; but the general notion that there are more earthquakes in winter than in summer receives some support from this table. The average per month for the ten years is 45; that for the six winter months (October–March) is 56; and for the six summer months 35, or about 40 per cent. less. An important element of disturbance in the figures would be the great improvement in seismological instruments since 1874, and the consequent registration of movements which would previously have passed unnoticed.

THERE have been a number of earthquake shocks during the past week. Another severe shock, accompanied by what is described as a tremendous report, occurred at Alhama, on January 27. By the fall of a house one person was killed and two others were injured. On the 27th and 28th fresh shocks occurred in the hot spring district of Southern Styria; also at four o'clock on the morning of the 27th a severe and prolonged shock was felt at Valparaiso. On the 31st a shock occurred at Algiers, destroying eight Arab houses. The shock was also felt at Setif.

MR. JAMES JACKSON, of the Paris Geographical Society, has issued a new and much extended list of various speeds in metres per second. It begins with the Mer de Glace at 0·0000099 m. per second, and concludes with the current from a Leyden jar in a copper wire of 0·0017 m. at 443,500,000 m. per second.

WE are glad to see that the *Health Journal*, the first number of which we noticed, is still continuing to do good work in connection with sanitary science. We have before us the twenty-first number, which contains several useful articles. We commend the *Journal* to the notice of those interested in the subject. It is published by Heywood, of Manchester.

THE *Journal de Saint-Pétersbourg* states that the first Russian school for Mussulmans has been opened at Tashkend. The pupils, who belonged to the families of native notables numbered forty-one at the commencement. It is proposed to open schools of the same kind elsewhere.

WHEN M. Barral died he had written the larger part of a "Dictionnaire d'Agriculture." The first number, which contains 250 pages large 8vo, two columns, closely printed, has just been published by Hachette and Co. About twelve similar parts will follow in the course of four or five years.

THE additions to the Zoological Society's Gardens during the past week include a Malbrouck Monkey (*Cercopithecus cynosurus* ♂) from West Africa, presented by Mrs. East; a Sambur Deer (*Cervus aristotelis* ♂) from Madras, presented by the Officers 1st Battalion Essex Regiment; a Long-eared Owl (*Asio otus*), a Tawny Owl (*Syrnium aluco*), British, presented by Mr. Geo. E. Crisp; a Malayan Tapir (*Tapirus indicus* ♂) from Malacca, a White Stork (*Ciconia alba*), European, two Magpies (*Pica rustica*), British, deposited; two Calandra Larks (*Melanocorypha calandra*), European, purchased; five Striped Snakes (*Tropidonotus sirtalis*), born in the Gardens.

OUR ASTRONOMICAL COLUMN

THE OCCULTATION OF ALDEBARAN ON FEBRUARY 22.—In the occultation of Aldebaran on the 22nd of the present month, the immersion takes place while the sun is above the horizon in this country, and the emersion soon after sunset. The following times and angles are founded upon the data of the *Nautical Almanac*, the angles being reckoned as in that work; the times are Greenwich mean times at the respective observatories:—

	Immersion	Angle from N. point	Emersion	Angle from N point
	h. m.	°	h. m.	°
Greenwich... ...	5 16·6	... 36 ...	5 49·6	... 344
Oxford	5 13·3	... 40 ...	5 49·7	... 341
Cambridge ...	5 14·9	... 41 ...	5 52·6	... 339
Dublin	5 1·8	... 52 ...	5 50·0	... 329
Liverpool	5 7·3	.. 49 ...	5 53·3	... 331
Glasgow	5 3·7	... 60 ...	5 57·9	... 320
Edinburgh... ...	5 5·3	... 59 ...	5 59·3	... 321

VARIABLE STARS.—Dr. Gould notifies the detection of three new variable stars at Cordoba, which he calls respectively R Lupi, R Piscis Austrini, and R Phœnicis. In his communication to the *Astronomische Nachrichten* he refers to his recently published zones for their positions, which, brought up to the beginning of the present year, will be:—

	R.A.	Decl.
	h. m. s.	°
R Lupi	15 46 1 ...	−35 57·2
R Piscis Austrini ...	22 11 28 ...	−30 10·7
R Phœnicis	23 50 29 ...	−50 25·6

By Argelander's formula of sines the last maximum of *Mira* should have occurred on January 28, but the maxima and minima of the last four or five years appear to have taken place between a fortnight and three weeks earlier than the dates assigned by the formula. Perhaps some reader of NATURE may be able to fix the time of the recent maximum from his own observations.

WOLF'S COMET.—The following ephemeris of Wolf's comet of short period is deduced from Herr Thraen's ellipse, which depends upon normal places to November 23. The comet was observed without difficulty at Lund on January 20:—

At 6h. Greenwich Mean Time

1885	R.A.	Decl.	Log. distance from Earth	Log. distance from Sun
	h. m. s.	° ′		
Feb. 6 ..	2 10 44 ...	−3 2·7 ...	0·2569 ...	0·2478
7 ...	2 13 8 ..	2 55·6		
8 ...	2 15 31 ...	2 48·6 ...	0·2628 ...	0·2500
9 ...	2 17 55 ...	2 41·5		
10 ...	2 20 18 ...	2 34·4 ...	0·2687 ...	0·2522
11 ...	2 22 41 ...	2 27·2		
12 ...	2 25 4 ...	2 20·0 ...	0·2745 ...	0·2544
13 ...	2 27 26 ...	2 12·8		
14 ...	2 29 48 ...	−2 5·5 ...	0·2803 ..	0·2567